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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,534	06/14/2001	Garo J. Derderian	MI22-1752	8714
21567	7590	01/13/2005	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			THOMAS, TONIAE M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 01/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/882,534

Applicant(s)

DERDERIAN ET AL.

Examiner

Toniae M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2004.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 32-56 is/are pending in the application.
4a) Of the above claim(s) 32-35, 40-51, 53, 55 and 56 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 36-39, 52 and 54 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 03/16/04; 10/04/04.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is an official response to the amendment filed on 04 October 2004. The amendment added claims 53-56. Currently, claims 32-56 are pending.

Election/Restrictions

2. *Claims 32-35, 40-51, 53, 55, and 56 are directed to an invention that is patentably distinct from the invention originally claimed.* The claimed invention is a capacitor construction, which comprises two atomic layer deposited insulative barrier layers, one barrier layer between a first electrode and a dielectric layer, *and* the other barrier layer between the dielectric layer and a second electrode. In the originally claimed invention, the capacitor construction comprises a single atomic layer deposited insulative barrier layer.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 32-35, 40-51, 53, 55, and 56 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject

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matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. *Claims 36-39, 52, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi (US 5,316,982) and Kim et al. (US 6,270,572 B1).*¹

Taniguchi discloses a capacitor construction (fig. 1 and col. 1, line 67 - col. 3, line 42). The capacitor construction comprises the following elements: a first capacitor electrode 7 over a substrate 3 (fig. 1; col. 2, lines 64-66; and col. 3, lines 10-11); an insulative barrier layer 8 to oxygen diffusion over the first electrode (fig. 1; col. 2, line 66; and col. 3, lines 27-31); a capacitor dielectric layer 9 over the barrier layer (fig. 1; col. 2, line 67; and col. 3, lines 31-37); and a second capacitor electrode 10 over the dielectric layer (fig. 1 and col. 2, lines 67-68).

The thickness of the barrier layer is 10 to 50 Å (col. 2, lines 6-7). This range includes thicknesses that are less than 12 Å. Thus, Taniguchi teaches that the barrier layer has a thickness of 12 Å, as recited in claim 37.

The barrier layer comprises Al₂O₃, as recited in claim 38 (col. 3, lines 27-31), which exhibits a k factor of greater than 7 at 20°C, as recited in claim 39.

Taniguchi lacks anticipation only in not teaching that the Al₂O₃ insulative barrier layer comprises a chemisorption product of first and second substantially saturated precursor monolayers, as recited in claim 36, wherein the precursors are different, as recited in claim 52.

The Kim et al. patent (Kim) discloses an atomic layer deposited (ALD) thin film (figs. 1-8, 9A, 9B and col. 2, line 58 – col. 4, line 46). The thin film comprises a chemisorption (chemical adsorption) product of first and second substantially saturated precursor monolayers, wherein the precursors are different (fig. 9A or fig. 9B and col. 4, lines 37-46). In a specific application, the atomic layer deposited thin film is an Al_2O_3 layer, which is deposited onto a silicon substrate (figs. 10, 11, and col. 4, line 50 - col. 6, lines 28).

Since Taniguchi and Kim are from the same field of endeavor, the purpose disclosed by Kim would have been recognized in the pertinent art of Taniguchi by one of ordinary skill in the art at the time the invention was made.

As discussed above, Kim discloses an Al_2O_3 thin film comprising a chemisorption product of first and second substantially saturated precursor monolayers. The Al_2O_3 is an atomic layer deposited Al_2O_3 . The atomic layer deposited Al_2O_3 has excellent step coverage as well as precise stoichiometry and high density (Kim – col. 1, lines 16-22 and col. 2, lines 21-26). It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to replace the Al_2O_3 layer in Taniguchi with an atomic layer deposited Al_2O_3 layer, as taught by Kim, because an atomic layer deposited Al_2O_3 layer has excellent step coverage as well as precise stoichiometry and high density (Kim – col. 1, lines 16-22 and col. 2, lines 21-26). First, since an

¹ The Kim et al. patent was relied upon in the previous Office action mailed on 04 June 2004.

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atomic layer deposited Al_2O_3 layer has excellent step coverage, the thickness of the Al_2O_3 insulative barrier layer on the sharp corners of the lower electrode is substantially the same as the thickness of the barrier layer on the flat surfaces of the lower electrode. Secondly, since an atomic layer deposited Al_2O_3 layer has precise stoichiometry, a separate annealing step is no longer required to convert the deposited Al_2O_x insulative barrier layer into stoichiometric aluminum oxide, Al_2O_3 . Thirdly, since an atomic layer deposited Al_2O_3 layer is a high density film, the Al_2O_3 insulative barrier layer has substantially no voids.

Response to Arguments

4. Applicant's arguments with respect to claims 36-39, 52, and 54 have been considered. However, the arguments are moot in view of the new ground of rejection.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH**

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shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday-Thursday from 8:30 a.m. to 5:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MMJ

03 January 2005



Mary Wilczewski
Primary Examiner